2000

Making network centric warfare a reality

Monterey, California, Naval Postgraduate School

Making Network Centric Warfare a Reality

With post Cold War decreases in manpower, weaponry and budgets, future Navy warfighting will have to be far more efficient than it is today. To achieve that efficiency, the Reduced Crew Ship of 2020 will need to rely heavily on distributed Cooperative Engagement Capability (CEC). This theater-wide capability allows a group of ships to quickly process and share target data, and to launch defending missiles before an enemy missile crosses the defending ship's radar horizon.

One of Professor Calvano's TSSE students, Lt. Thomas Jean, recently brought this Network Centric Warfare capability a giant step closer to reality. His thesis, "Design Considerations for Distributed Combat Systems on Small Combatants Using Cooperative Engagement Capability," translated the vision of Cooperative Engagement Capable Distributed Combat Systems (CECDCS) into design goals specific enough that a robust multi-sensor-fused advanced distributed engagement system can be developed. His proof of concept thesis showed that the bandwidth is there to integrate additional COTS sensors - infrared, sonar, and an ECM suite - into existing integrated radar systems; and that large numbers of minimally manned, individually less capable but less expensive ships networking sensors, fire control, and command-and-control can perform as a single fighting pod with enhanced collective performance in all warfare areas.

"The current AEGIS system takes a lot of human interpretation to identify friend or foe because it networks only one type of sensor, fire-control-quality radar," Jean explained. "When you add other modality sensor data into a cross-platform CEC-like network you get faster, better cross-pod target ID and target evals. This can make all the difference in a hostile environment where reaction times are getting shorter and shorter. My major contribution was to show that this proposed new force structure really can do a lot more for less cost to the Navy. By configuring it this way, you get the fighting power of 180 ships vice the current 106. "

"Lt. Jean brought together the experience gained in networking ships for air and submarine defense, and projected it forward two decades into the future," said his thesis advisor, Professor Mike Melich of the NPS Physics Department. "It's the Lt. Jeans of the world who reduce the metaphorical flourishes of planning staffs to Fleet practice, and drive real creation in the research, development and naval construction communities. Without such skilled people, schooled in the ways of the Fleet and informed in the ways of technology, business and economics, our future Fleet would look little different from the one we inherited from World War II."

A major barrier to robust Cooperative Engagement Capability is the problem of how to integrate multi-rate, multi-resolution, multi-spectral, often asynchronous data from a wide array of sensors and feed it into weapons control and other systems robustly enough that it can be successfully used by warfighters. A faculty-student team led by Operations Research and Aviation Safety School Professor Kip Krebs (former Lt., USN) is researching how to 'fuse' the best data from night vision devices and Forward Looking Infrared (FLIR) sensors into a single image to improve situational awareness in low-light and night operations.

"Each sensor has advantages and disadvantages and, by fusing them, you capitalize on each one's strengths," said Capt. Matt Sampson, USMC, a helicopter pilot and one of Krebs' students. "We're working with the CNO's Aviation Air Warfare Office, looking at ways to improve targeting capabilities on the F/A-18 and to improve piloting and navigation on the Cobra helicopter," Krebs explained.

Other students are helping improve the Navy's Phalanx Close-in Weapon Systems by testing stabilizers which keep its FLIR steady as it is being aimed.

Fast, secure, reliable broadband data links are the backbone of future Cooperative Engagement Capability and Network Centric Warfare. The current state-of-the-art, high-data-rate global satellite communications system that gives operational

commanders near-instantaneous voice and video links, distributes enhanced intelligence imagery to ships throughout the Fleet, and makes it possible for Sailors to 'call home' - CHALLENGE ATHENA - was developed by Lt. Cmdr. John Hearing while an officer student at NPS. The system, which uses all-COTS components, also supports the video teleconferencing needed for shipboard Distance Learning.

"CHALLENGE ATHENA was the most significant boost to morale in my 25 years of naval service," said then Commanding Officer of the USS George Washington Capt. Robert Sprigg, now Rear Admiral.

NPS' Fleet Wireless Working Group and students Lt. Robert Moss and Lt. Stephen Tripp recently combined a 'loosely coupled components' software architecture with GPS devices to create wireless shipboard computer-to-computer communications, including wireless Internet access. Their proof-of-concept system has a wider bandwidth than either the currently used Naval Tactical Data System (NTDS) or LINK 11. Also this year, Professor Xiaoping Yun and his students Lts. Mark Matthews, Mark Roemhieldt and Kurt Rothenhaus set up a wireless Local Area Network (LAN) connected to wearable mobile computers on board the aircraft carrier USS Harry S. Truman.

NPS is also a key participant in a multi-year cooperative research effort on Adaptive Architectures for Command and Control for Network Centric Warfare. It recently partnered with the Naval War College and Third Fleet in a four-day pre-game rehearsal for "Global Wargame 1999," at the School. NPS has also teamed with Third Fleet's Network Centric Innovation Center and sea based battlelab, USS Coronado, to identify, develop and test new IT/C4I systems and innovative practices.

Training for Jointness